

Radiation Mitigation Methods for Reprogrammable FPGA, Phase II

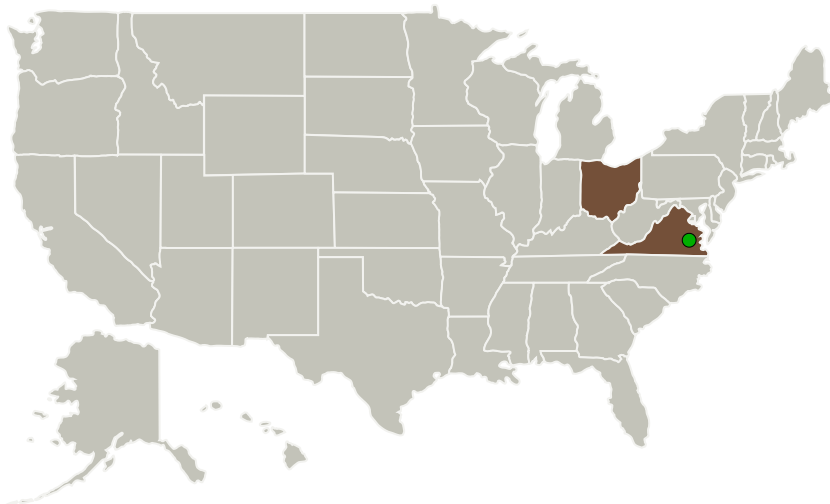
Completed Technology Project (2010 - 2014)



Project Introduction

NASA has been tasked to develop new and advanced capabilities to support both future manned and robotic missions to the lunar and Martian surfaces. It is the purpose of this program to develop advanced avionics, software, and information technologies for exploration missions. In particular, NASA is concerned with the extreme radiation present on the lunar surface, Martian surface, and in deep space. Spacecraft electronics will need to be radiation hardened against a TID of 100 krad (Si) or more and provide SEL immunity of 100 MeV cm²/mg or greater. Furthermore, electronics in these environments are also subjected to multiple thermal-cycling and wide temperature ranges. Our innovation provides solutions for the mitigation of radiation effects on reprogrammable SRAM-based FPGA processor elements through the use of an advanced foundry process combined with innovative and RHBD methods to mitigate total ionizing dose and provide SEL immunity, and SEU tolerance. These techniques will be utilized to develop a prototype of radiation hardened, reprogrammable FPGA that will be fabricated and tested, suitable for consideration in future NASA Flagship programs.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
RNET Technologies, Inc.	Lead Organization	Industry	Dayton, Ohio
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

**February 2010:** Project Start**December 2014:** Closed out**Closeout Summary:** Radiation Mitigation Methods for Reprogrammable FPGA, Phase II Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/137367>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

RNET Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

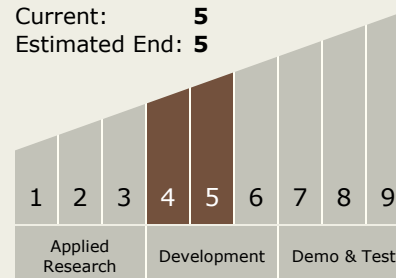
V. Nagarajan

Technology Maturity (TRL)

Start: 4

Current: 5

Estimated End: 5





Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.1 Avionics Component Technologies
 - └ TX02.1.5 High Performance Field Programmable Gate Arrays

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System